

Studies of Interferometric Penetration into Vegetation Canopies using Multifrequency Interferometry Data at JPL

by

by Scott Hensley, Ernesto Rodriguez, Bob Truchaff, Jakob Van Zyl, Paul Row,
Charles Werner, Søren Madsen and Elaine Chapin

Jet Propulsion Laboratory
Radar Science and Engineering Section
4800 Oak Grove Dr.
Pasadena, California 91109
Phone: (818)-354-3322, email: sh@kaitak.jpl.nasa.gov

Radar interferometric observations both from space borne and airborne platforms have been used to generate accurate topographic maps, measure millimeter level displacements from earthquakes and volcanoes, and for making land cover classification and land cover change maps. Interferometric observations have two basic measurements, interferometric phase, which depends upon the path difference between the two antennas and the correlation. One of the key questions concerning interferometric observations of vegetated regions is where in the canopy does the interferometric phase measure the height. TOPSAR simultaneous dual C and L-band interferometer and repeat pass AIRSAR P-band and γ -3 UHF data have been studied to determine the amount of differential penetration into various types of vegetation. Our results show that the L, P and UHF frequency interferometric data can penetrate 10 - 20 m deeper into the canopy than C-band measurements. By operating the TOPSAR instrument in the ping-pong mode (alternately transmitting and receiving on each antenna) dual baseline multifrequency C and L-band data have been obtained and used for baseline decorrelation and vegetation parameter extraction. Results for two methods of extracting tree heights and other vegetation parameters based upon the amount of volumetric decorrelation will also be presented.